

ITS Field Operational Test Summary

Spread Spectrum Radio Traffic Signal Interconnect

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Introduction

The Spread Spectrum ITS Field Operational Test investigates the feasibility of using spread spectrum radio (SSR) to control a traffic signal system. The test assesses the use of this technology as an alternative to conventional copper wire interconnect. The test has two purposes:

- Examine whether SSR is a reliable means of communicating in a metropolitan area
- Assess the cost savings that may occur through use of SSR.

The test is taking place in the City of Los Angeles, Los Angeles County, California. Field testing of the radio interconnect component began in January 1998. The Final Report is expected in March 1998.

Project Description

SSR is a form of wireless communication that offers the potential to rapidly communicate with any traffic signal intersection from a central location without the extensive trenching and cabling normally associated with such activity. If SSR can demonstrate a level of reliable data transmission equal or superior to that normally achieved with copper wire interconnect, the potential for cost saving in the installation of the system is high. In Los Angeles, SSR transmits in the 900 MHz band. Other unlicensed SSR bands exist at higher frequencies. These higher frequencies are generally less congested but have smaller ranges for a given power output.

Using the 900 MHz band may present interference problems for the SSR. The 900 MHz application is authorized by the Federal Communications Commission under Part 15 of its rules and regulations governing radio frequency (RF) transmission. The 900 MHz band is unlicensed and does not enjoy protection from interference that licensed users enjoy. One important consequence of using the 902 to 928 MHz band is that there is no control on the number and type of users. Other users of this band typically include paging services, cordless telephones, garage door openers, remote access or control of utility company assets, stolen vehicle recovery services, and hotel room key locking systems. Incidental, out-of-band RF radiation from Federal Aviation Authority, Department of Defense, and weather radar applications may also pose potential interference problems for critical applications in this 900 MHz band.

The test has deployed approximately 100 SSR radios in the West of Los Angeles, in and around Marina Del Ray and Culver City. The radios are distributed, generally equally, in four signal networks, each of which has a "headend" radio and several "tailend" radios. Each of the radios is hard-wire connected to a traffic signal controller. The headend radio communicates with the tailend radios in the network using the spread spectrum radio traffic signal interconnect (RTI). Figure 1 shows a schematic view of the system.

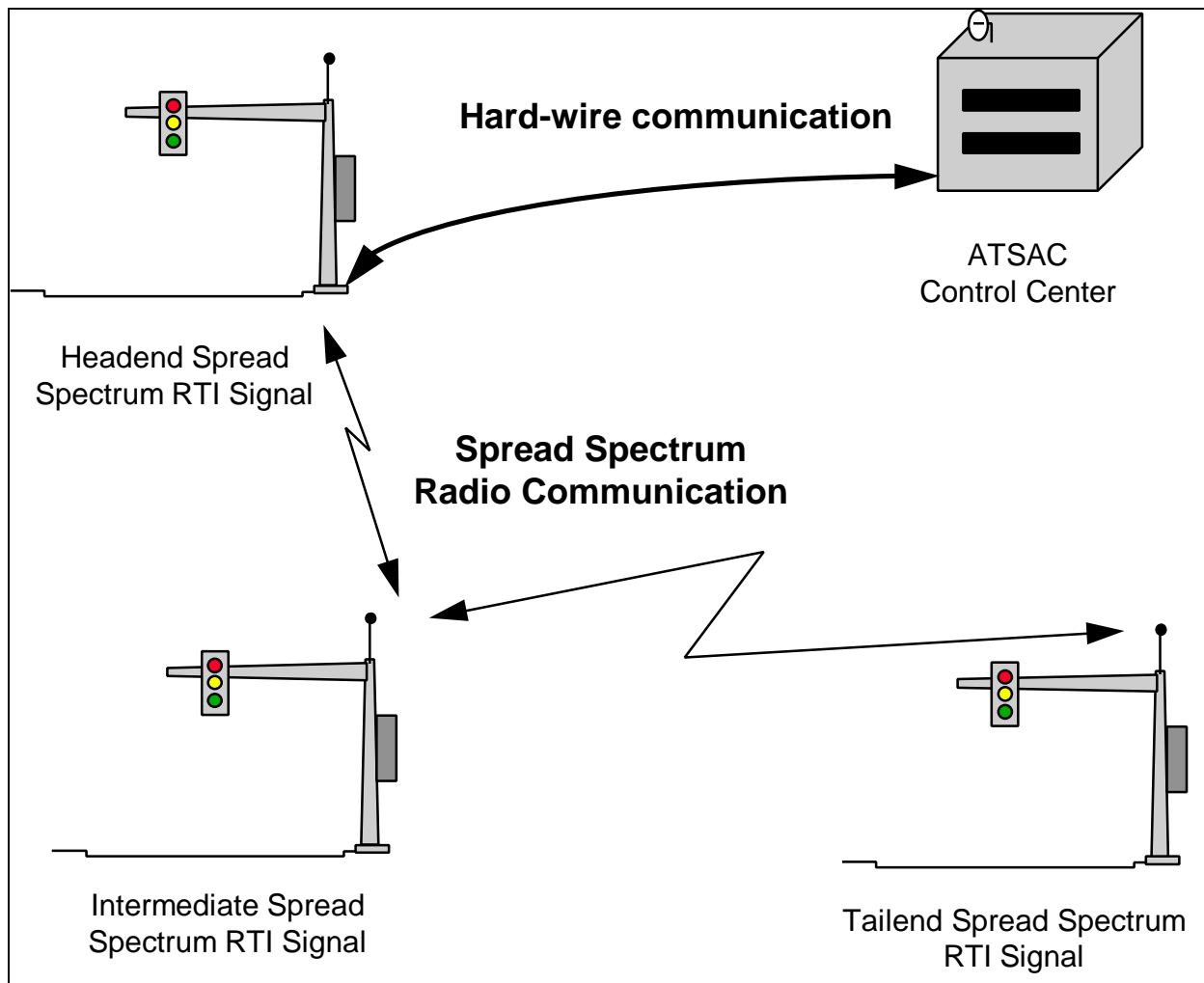


Figure 1: Schematic of Spread Spectrum System

The headend radio is connected via hardwire to the Los Angeles traffic control system, located at the Advanced Traffic Surveillance And Control (ATSAC) center in downtown Los Angeles. The ATSAC sends traffic signal control messages to the headend radio. The headend radio passes these messages to the appropriate tailend radio, using intermediate radios, if necessary. Each tailend radio communicates the messages to its corresponding traffic signal controller. A traffic signal controller passes messages to its corresponding radio that then relays the message to the headend radio via other intermediate radios. The headend radio passes these messages to the ATSAC. The test is assessing the performance of SSR under a range of traffic, weather, and installation scenarios.

SSR will be evaluated in two ways:

- Evaluating the technical details of system performance, specifically focusing on the quality of communications between radios
- Documenting practical lessons, focusing on cost effectiveness, time effectiveness, and transferability issues.

Test Status

The Spread Spectrum project began in 1994. The design tasks lasted until early 1996. Software implementation started in late 1995 and is continuing. Evaluation of the project began in mid 1995 and also continues. Actual traffic signal control will commence in January 1998. The Final Report is due in March 1998. No interim results are available.

Test Partners

California Department of Transportation

City of Los Angeles

Federal Highway Administration

Hughes (SSR)

Transcore (ATSAC/UTCS interface)

References

None published.